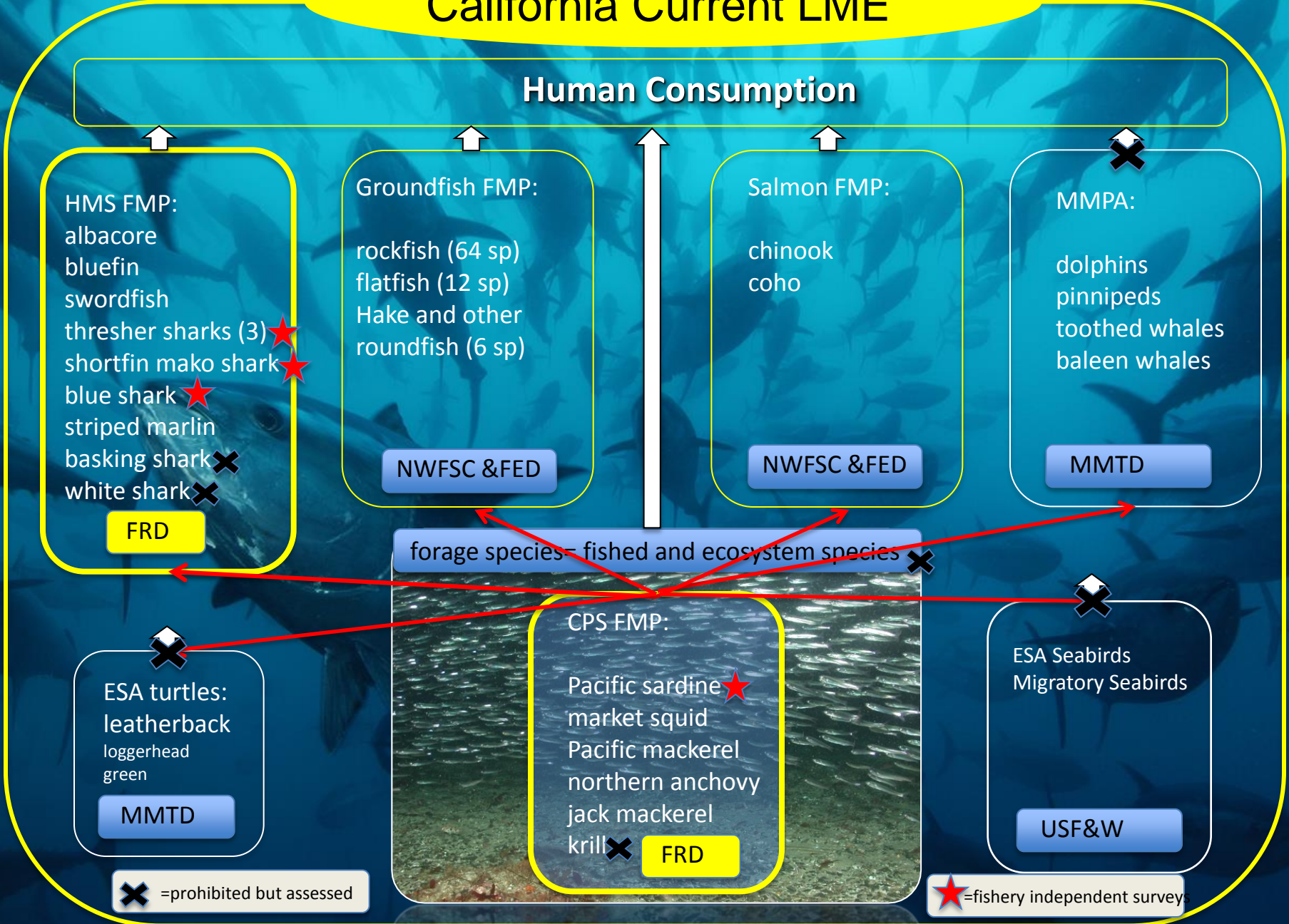


Agenda 3.1. Introduction to the Review of Data Collection in Support of CPS and HMS Management:

Russ Vetter, Director FRD

- 1. Introduction to the National and International Regulatory Frameworks for Pelagic Fisheries: CPS & HMS**
- 2. Introduction to the Division: History, Current Staffing, Current Organization, Budget**
- 3. The Special Nature of Pelagic Fishes, (Fish without Addresses)**
- 4. Special Considerations for CPS and HMS Monitoring and Data Collection: (oversampling and under sampling)**
- 5. Strengths, Challenges, Strategies for Data Collection & Data Management :**

California Current LME



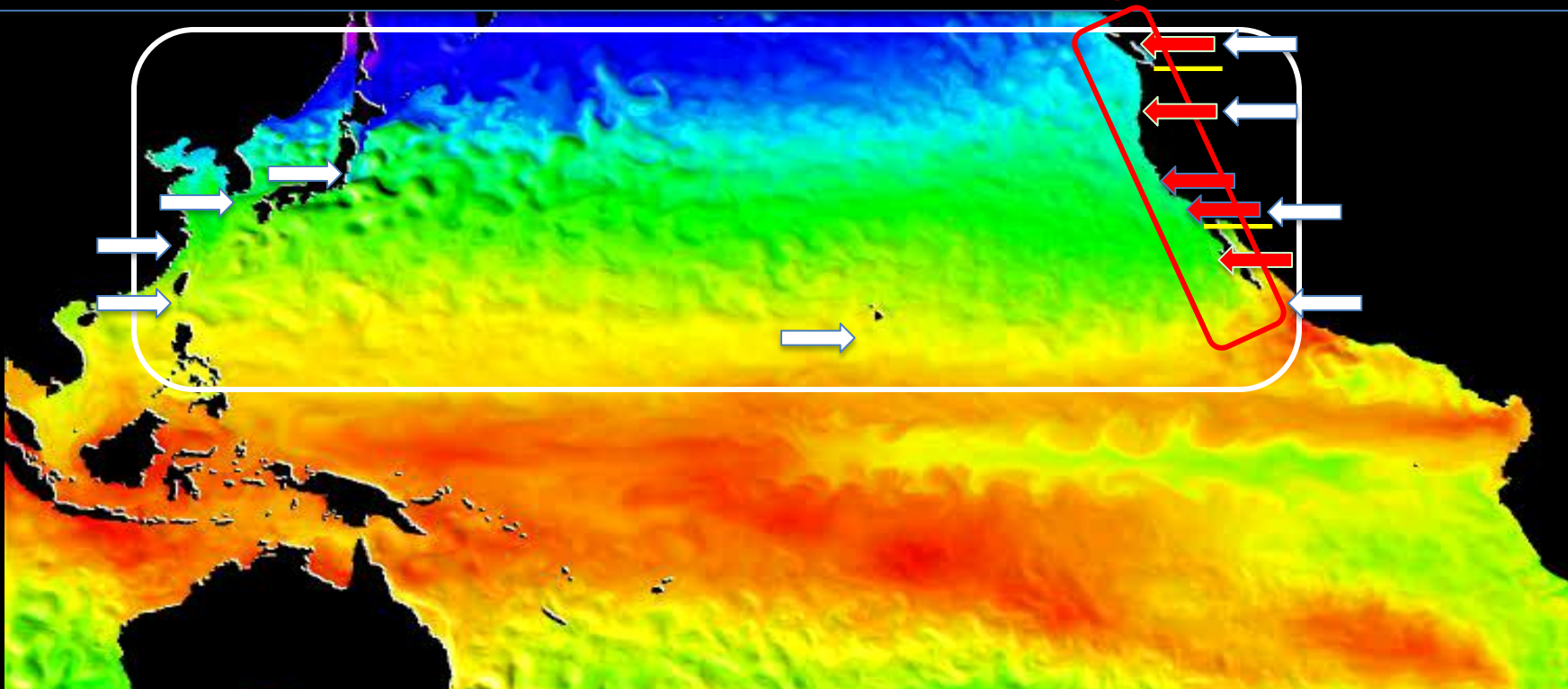
The International Regulatory Framework: FRD Leadership Roles:

CPS = sardine, anchovy, market squid, P. mackerel, J. mackerel, krill species.

HMS = albacore, bluefin, thresher, white, basking, mako, blue sharks

Coastal Pelagic Species (CPS):

tri-national distribution, multi-national data collection, unilateral management

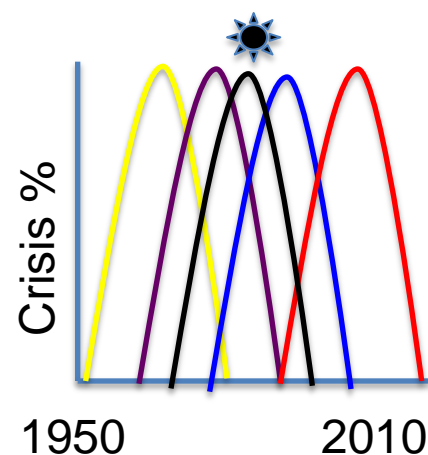
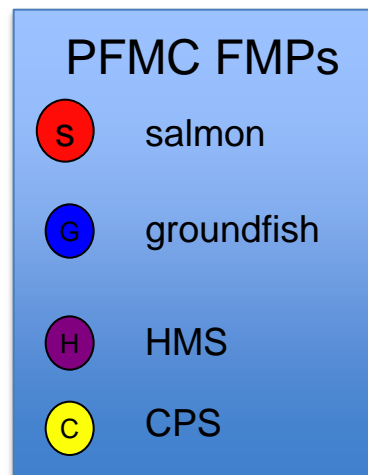
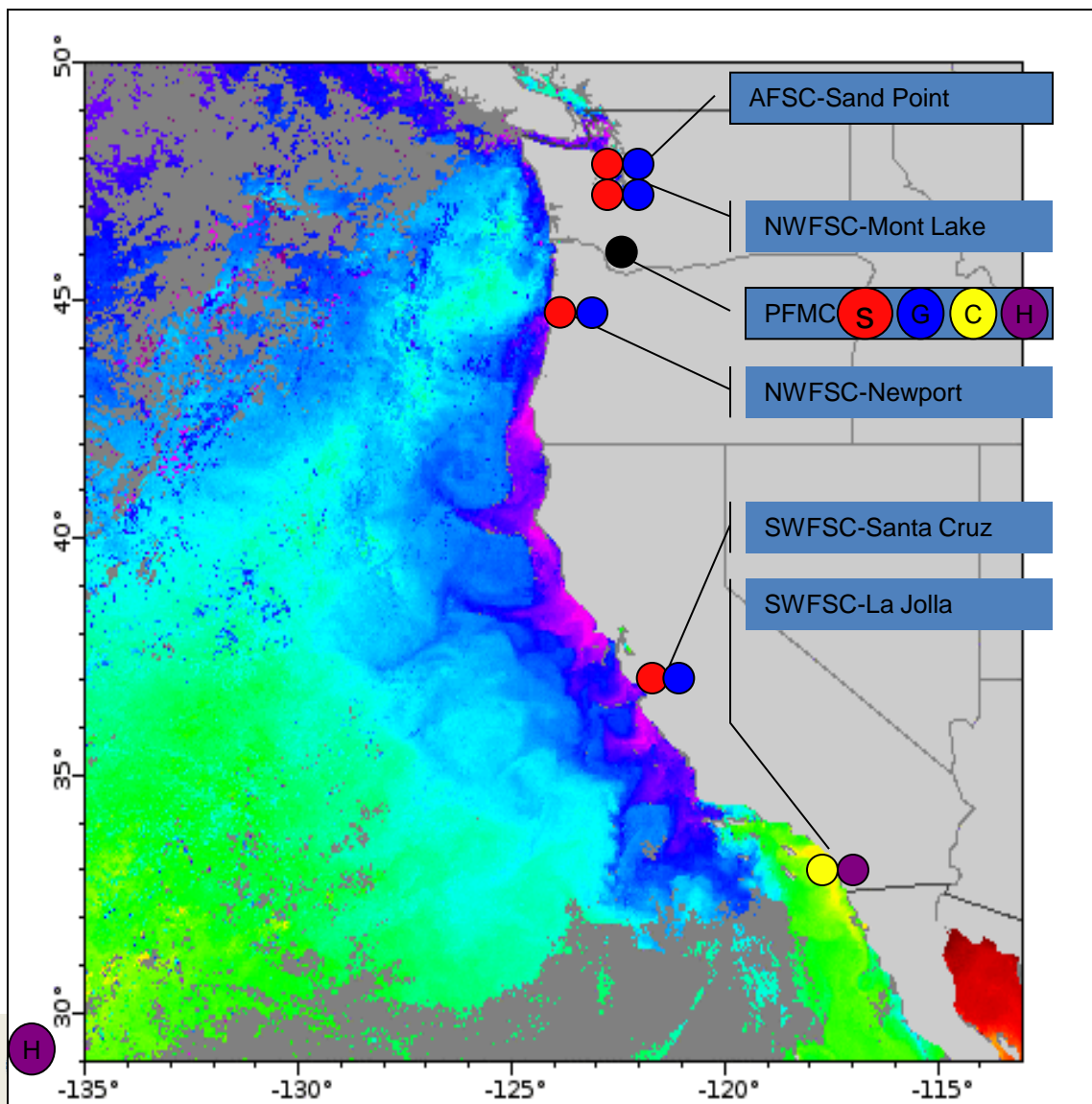


Highly Migratory Species (HMS): trans-Pacific distribution, ISC assessment: management via NC to WCPFC to WPFMC and/or IATTC to PPMC & US-Canada treaty



NOAA FISHERIES

Overview of NMFS and PFMC Organization



Organization of the Fisheries Resources Division

An Introduction to the Fisheries Resources Division, SWFSC July 29, 2013 MSRA Data Review

FRD Mandates: MSRA, ESA, MMPA, and International Fishing and Conservation Treaties

FRD Lead Responsibilities:

California Cooperative Fisheries Investigations, CalCOFI

Coastal Pelagic Species Fisheries Management Plan (CPS)

Highly Migratory Species Fisheries Management Plan (HMS)

International Scientific Committee for Tuna and Tuna Like Species (ISC)

ESA listed abalone

FRD Customers: PFMC, SW Region, ISC, IATTC, WCPFC, SPTT, State and University partners, the public and others.

FRD Staff: FTE's 42 full and part time,
recent vacancies 12

FRD Budget: 7-9 M base+ temp funds

64th Tuna Conference

64th CalCOFI survey year

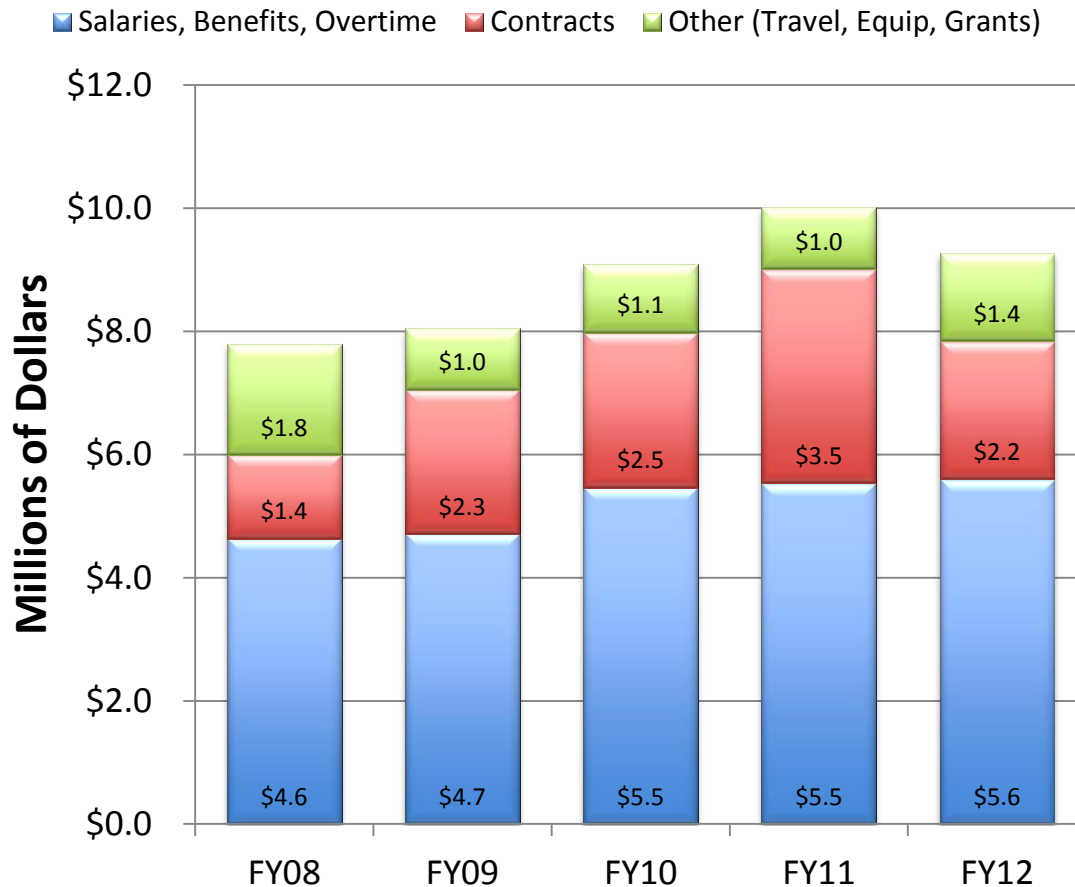
CalCOFI Reports: vol 53, 2012

13th Sardine Tri-national Forum



NOAA FISHERIES

Fisheries Resources Division Budget FY08-FY12



- Temporary Funds consist of 24-38% of the total FRD budget
- Contractors make up from 17-35% of total FRD budget

Fisheries Resources Division, Directors Office FTE's & Vacancy

Mandated Tasks:

Director: Russ Vetter

Fisheries Research:

CalCOFI Research Program
Coastal Pelagic Fisheries Research
Highly Migratory Species Research
ESA Research

Fisheries Management:

PFMC-CPSMT
PFMC-HMSMT
ISC
IATTC
ESA Listing and Recovery

Communication and Outreach:

Peer Reviewed Journal Publications
CalCOFI Journal and Atlas Series
Billfish Newsletter
Annual Tuna Conference
News Releases and Electronic Media

FRD Director: Russ Vetter

??

Research Director: Russ Vetter

Deputy Director for Administration and Regulatory Affairs: Dale Sweetnam

Research Planning Leads:

Fisheries Oceanography: McClatchie
Ship Operations: Griffith
Early Life History: Watson
Coastal Pelagics Life History: Dorval
Advanced Sampling Technology: Demer
Genetics and Physiology: Hyde
Highly Migratory Species Biology: Kohin
Economics and Social Science: Squires
Population Dynamics: Hill

Fishery Management Coordination:

Sweetnam

Administrative Tasks:

Budget Planning: Sweetnam
Budget Execution and Monitoring: Sanford
Travel Planning and Approval: Sweetnam
Travel Management: Sanford
Contract Planning and Approval: Sweetnam
Contract Management: Vice-Allen Vacant
Purchasing Approval: Sweetnam
Purchasing: Vice-Allen Vacant

Writing and Editorial Tasks:

CalCOFI Journal and Atlas: Contractor Heine
Peer Review Manuscript Processing: News
Releases and Electronic Media:
Contractor: Flores

- CalCOFI: California Cooperative Fisheries Investigations
- CPS: Coastal Pelagic Species (sardine, anchovy, mackerel etc.)
- HMS: Tunas, Billfishes and Pelagic Sharks
- PFMC: Pacific Fisheries Management Council
- ISC: International Scientific Committee for Tunas and tuna-like Species
- IATTC: Inter-American Tropical Tuna Commission
- ESA: Endangered Species Act

Red=contract

Purple=vacant

Fisheries Resources Division: Org and Work Flow

FRD Director: Russ Vetter



Coastal Pelagic Species (CPS) & CalCOFI
Sam McClatchie

Shared Programs

Highly Migratory Species (HMS)
Suzy Kohin

Fisheries Oceanography: McClatchie
2 FTE, 1 Vacant: Data manager

Population Dynamics: Hill
4 FTE, 1 Vacant: SSC and Assessment

Highly Migratory Species Biology: Kohin
3 FTE, 2 Vacant: Life history, Data mgmt

Ship Operations: Griffith
3 FTE, 2 Vacant: Sampling and Data

Advanced Sampling Tech: Demer
7 FTE, 2 Vacant

Fisheries Monitoring: Childers
1 FTE, 3 Vacant: Data management

Early Life History: Watson
6 FTE

Genetics, Physiology & Culture: Hyde
4 FTE, 1 Vacancy: Genetic Data mgmt

41 FTE's (full and part)
12 recent vacancies

Coastal Pelagic Life History: Dorval
3 FTE, 2 Vacant: Statistics and Data

Economics and Social Science: Squires
5 FTE

Planning and Admin		CPS-CalCOFI				Shared Programs					HMS	
FRD Director	Administration	CalCOFI Ship Operations	CPS Fisheries Oceanography	Ichthyoplankton Ecology	CPS Life History	Advanced Survey Technologies (acoustics)	Optical Surveys Benthic Ecology (ROV)	Genetics Physiology and Aquaculture	Economics & Social Science	Population Modeling Stock Assessment	HMS Biology	HMS Fisheries Monitoring
Planning and Admin		CPS-CalCOFI				Shared Programs					HMS	
Supervisors		EC-EOP-FMA	EC-EOP-EMA	McClatchie	EC-EOP-FMA	EC-EOP-FMA	EC-EOP-FMA	EC-EOP-FMA	EC-EOP-ESM	EC-EOP-FMA	EC-EOP-FMA	EC-EOP-EOD
Vetter 28LEF28-P01	Sweetnam K8LEF40-P11	Griffith K8LEF31-P10	McClatchie Ph.D. 28LEF28-P01	Watson K8LEF40-P11	Show 28LEF28-P01	Demer Ph.D. 28LEF28-P01	Stierhoff Ph.D. K8LEF40-P11	Hyde Ph.D. K8LEF40-P11	Squires Ph.D. K8LEF40-P11	Hill Ph.D. 28LEF28-P01	Kohin Ph.D. 28LEF28-P01	Childers K8LEF31-P10
FTEs	Sanford K8LEF31-P10	Hays K8LEF40-P11	Weber Ph.D. K8LEF40-P11	Thompson Ph.D. K8LEF40-P11	Show 28LEF28-P01	Cutter Ph.D. 28LEF28-P01	Mau 28LEF28-P01	Lynn 28LEF28-P01	Herrick Ph.D. K8LEF40-P11	Crone Ph.D. 28LEF28-P01	Dewar Ph.D. 0.75 K8LEF31-P10	
		Manion K8LEF40-P11		Charter K8LEF40-P11	McDaniel 28LEF28-P01	Sessions K8LEF31-P10	Murfin K8LPM38-P10		Stocha Ph.D. K8LEF33-P11	Teo Ph.D. 28LEF28-P01	Wraith K8LEF40-P11	
			Bowlin O.S. K8LEF40-P11	Maczewicz K8LEF40-P11		Renfree 28LEF28-P01			Hilger Ph.D. K8LEF33-P11	Piner Ph.D.		
				Acula K8LEF40-P11					Dealy K8LEF33-P11			
				Dunn 28LEF28-P01								
	Allen ZP-3 K8LEF40-P11	Abramkoff ZP-2 K8LEF40-P11	Jacobson ZP-2 K8LEF40-P11		Lo Ph.D. ZP-4 28LEF28-P01			Robertson ZP-3 28LEF28-P01		Conser Ph.D. ZP-4 28LEF28-P01	Vice-Ramon (med. disable) 28LEF01-P01	Vice-Kinane ZP-2 K8LEF40-P10
	Vice-Oliver ZP-4	Vice-Dotson ZP-3						Butler Ph.D. ZP-4 K8LPM38-P10		Vice-Lee Ph.D. ZP-3	Vice-Au Ph.D. ZP-4	Vice-Wallace ZP-3
	CPS coordinator unfunded							Kimbrell ZP-3 K8LEF31-P10			Vice-Reimann ZP-2	Vice-Coan ZP-4
	HMS coordinator unfunded		Ecosystem Modeling ZP-3 unfunded			Data Manager ZP-3 unfunded		Genetics ZP-3 unfunded	Social Scientist, Ph.D. ZP 3/4 unfunded		Life History Ph.D. unfunded	
Contractors	Heine CalCOFI coord. (2.5) 28LEF01-P1A FRD Dir/Admin	Overcash		Gardner	Dorval Ph.D. 28LEF01-P11 (Admin) J8LAF28-P03 (Lo)	Zwolinski Ph.D. AST J8LAF28-P06	Netzer J8LH407-P00	Javier Ph.D. 28LPM38-P14	Janofsky PFSC H8LEF33-P10 H8LFFMS-PNF	Sippel Ph.D. EASA J8LAF28-P1	Preti (0.75) COOP EASA J8LEF33-P10	Suter (1.0) EASA J8LEFFD-P13
	Schott Tech Writer 0.5 28LEF28-P1A FRD/Dir/Admin			(Audrey) Scientist II 28LEF01-P11	Stats/Data/Prog J8LAF28-P03 J8LFFMS-P91 (SWR)	Terrzo CPS AST J8LAF28-P06	Kulkosha J8LAFMS-PNF	Priddy Ph.D. BREP	LaFrance, Ph.D. J8LEF33-P12		Snodgrass COOP EASA J8LAF28-P1G J8LAA09-P16	Aryafar
					Reed EASA H8LAF28-P1P (Lo) 28LEF01-P16 J8LEFFD-P10	Needham J8LAF28-P06		Guenther Ph.D. Aquaculture			Nasby-Lucas White Shark	Nguyen J8LEFFD-P13
											Kinney Ph.D.	Osborne

FTE's
39 full & part

% time
recent FTE hire

vacancies
14

<11/23/09
recent unfilled

ISC position
Council
data manager

CCLME EBM Coastal Pelagic Species (forage)

Regulatory Authorities:

- a. SWR
- b. PPMC-CPSMT

Ship Operations and CalCOFI: Griffith

- a. Ichthyoplankton: Bongo, Manta, CUFES, CalVET
- b. Oceanography: CTD stations and underway sampling
- c. Acoustics: EK 60 calibration, Fas-Tow-Cam (Demer)
- d. Nets: Nordic 264 plus MMED
- e. Shipboard computing and data storage

Partners: Fishery Dependent Data

- a. California, Oregon, Washington
- b. Mexico, Canada
- c. NWFSC

Ichthyoplankton Ecology: Watson

- a. Plankton preservation
- b. Sorting
- c. Fish egg and larval identification
- d. Squid paralarval identification
- e. Fish egg and larval staging/measurement

Coastal Pelagic Life History: Dorval

- a. Trawl sample database
- b. Adult reproductive parameters
- c. Otolith aging
- d. DEPM
- e. Population models and assessments

Fisheries Oceanography: McClatchie

- a. Oceanographic analyses
- b. Developing environmental indices
- c. Maintaining CalCOFI databases

CPS Management
Ecosystem Management
Climate Change

Fisheries Genetics and Biotechnology: Hyde

- a. Stock structure: DNA
- b. Stock structure: otolith chemistry
- c. Species ID
- d. Climate Effects on M and Productivity

Social Science: Squires

- a. CPSMT
- b. Capacity
- c. Allocation (Catch Shares)
- d. Valuation and Ecosystem Services

Advanced Survey Technologies: Demer

- a. Optimal allocation of sampling effort
- b. Identification of acoustic targets
- c. Estimation of acoustic target strengths
- d. Estimation of total survey error
- e. Acoustic biomass estimation

North Pacific + CCLME HMS Species (predators)

Regulatory Authorities:

- a. SWR
- b. PIRO
- c. IATTC
- d. WCPFC
- e. ISC
- f. PFMC

Fishery Independent Surveys: Kohin

- a. Juvenile Shark Survey (offshore longline)
- b. Thresher neonate survey (inshore longline)
- c. Albacore archival tagging
- d. SLUTH

Partners: Fishery Dependent Data

- a. California, Oregon, Washington
- b. Mexico, Canada
- c. SWR, PIRO
- d. ISC
- e. SPTT

HMS Biology: Kohin

- a. Age and growth
- b. Diet studies
- c. Electronic tagging & TOPP
- d. Conventional tagging
- e. Habitat and Climate
- f. Bycatch

HMS Population Modeling: Hill

- a. SSC HMS subcommittee
- b. PFMC HMSMT
- c. ISC albacore working group
- d. ISC bluefin working group
- e. ISC shark working group
- f. IATTC, US-Canada treaty

HMS Fisheries Monitoring: Childers

- a. Albacore troll fishery
- b. Albacore bait fishery
- c. SPTT
- d. DGN
- e. Observer program DGN

HMS Management
Ecosystem Management
Bycatch Reduction

Fisheries Genetics and Biotechnology: Hyde

- a. Stock structure: DNA
- b. Stock structure: otolith chemistry
- c. Species ID
- d. Genetic Estimation of Stock Size
- e. Climate effects on M and growth

Social Science: Squires

- a. HMSMT:
- b. SPTT
- c. Capacity
- d. Allocation (Catch Shares)
- e. Ecological Footprint & Bycatch

Fisheries Oceanography: McClatchie

- a. Albacore habitat
- b. Fronts and eddies
- c. Climate effects on distribution
- d. Climate effects on productivity



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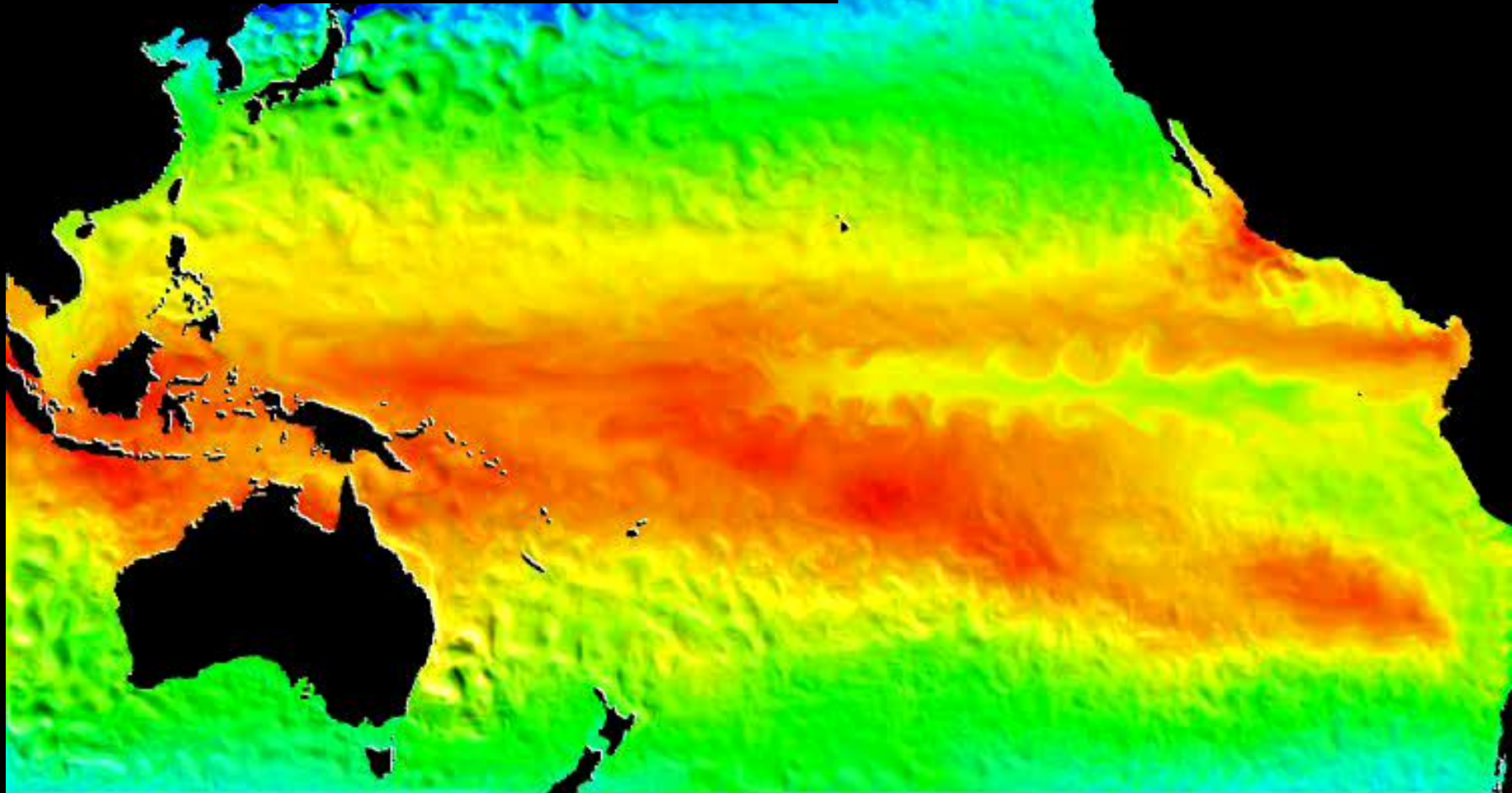
3. The Special Nature of Pelagic Fishes

Typical Fisheries Assessment:
Abundance Trends with Time

Pelagic Fisheries Assessment:
Distribution and Abundance with Time

Distribution as it Affects Sampling Space:

1. Seasonal Movements
2. Inter-Annual Movements
3. Decadal Range Changes
4. Life History Movements
5. Climate Effects on Vertical Distribution

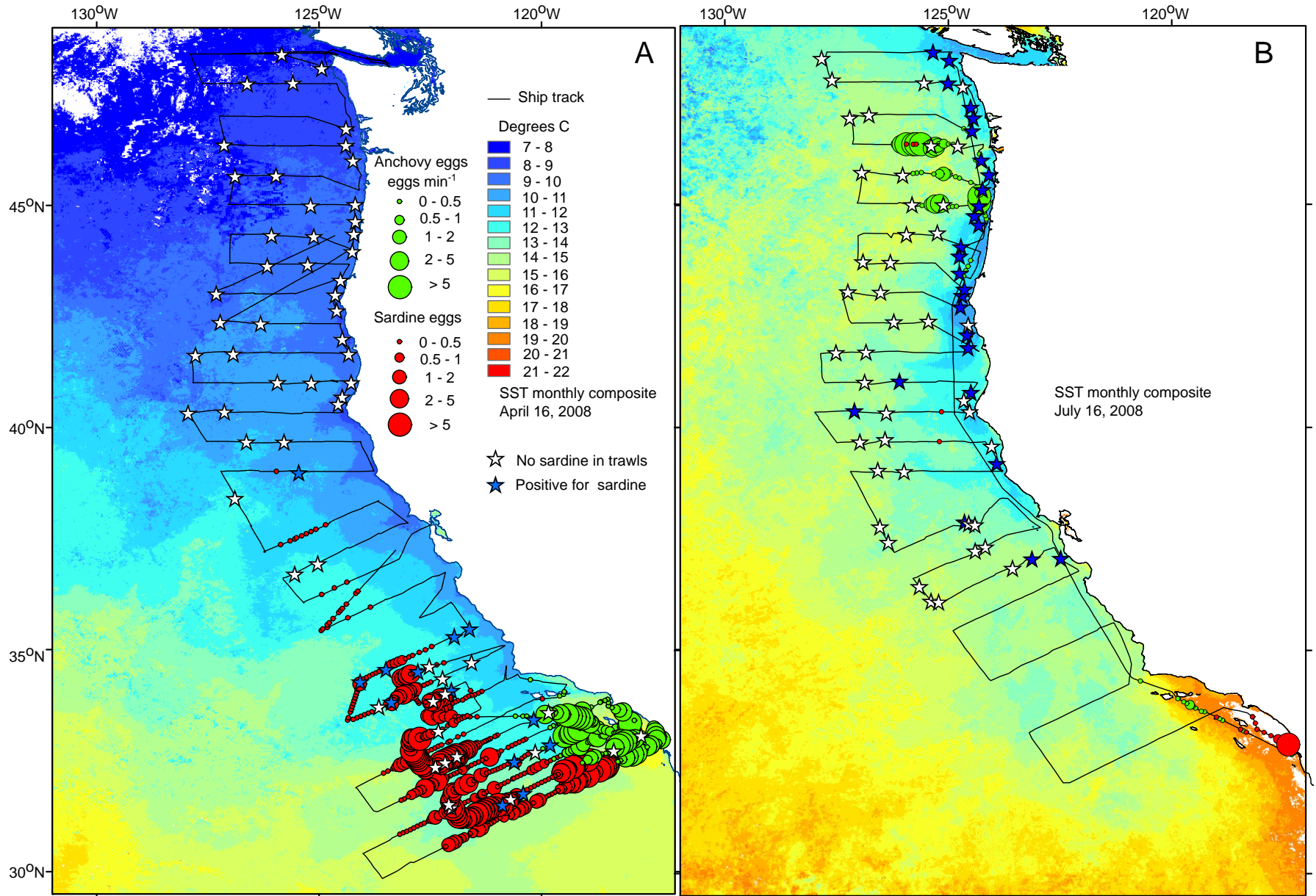


Time(year)

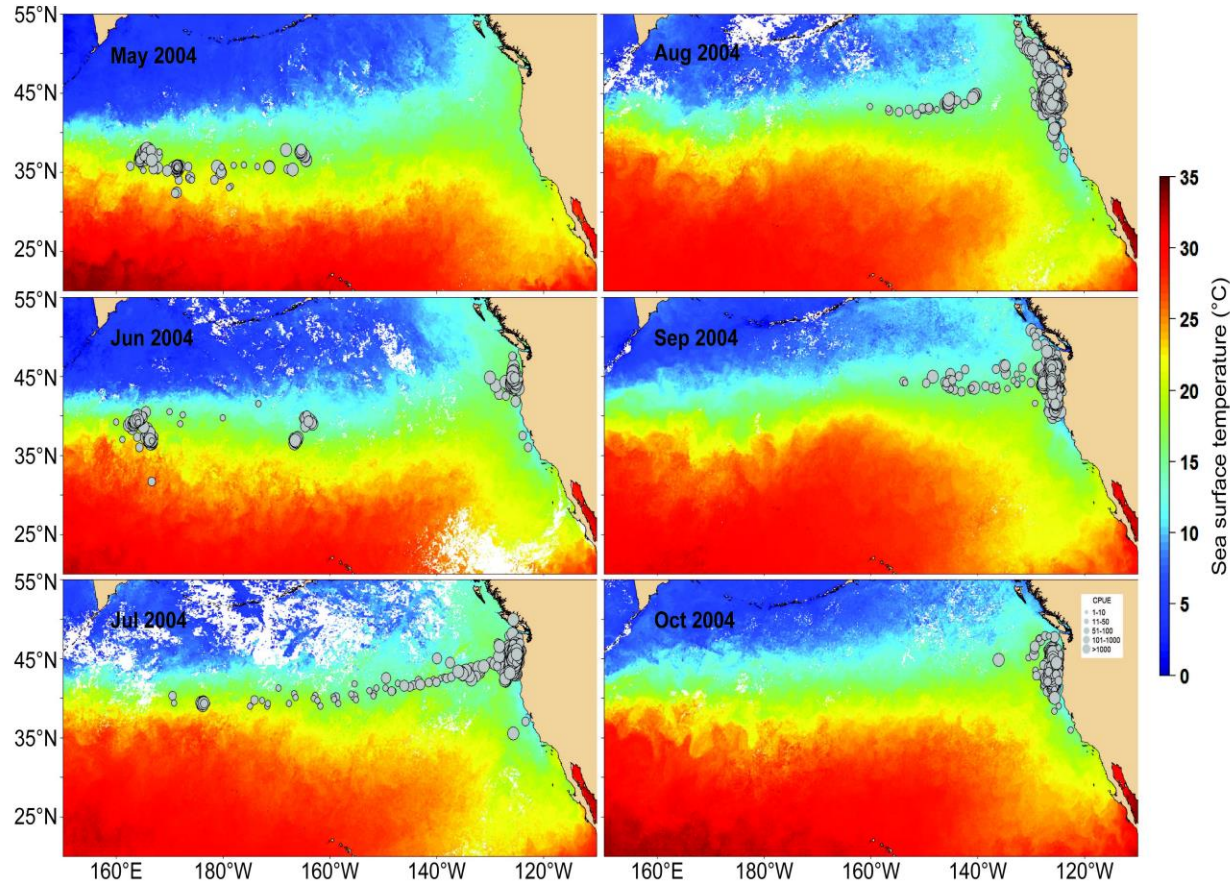


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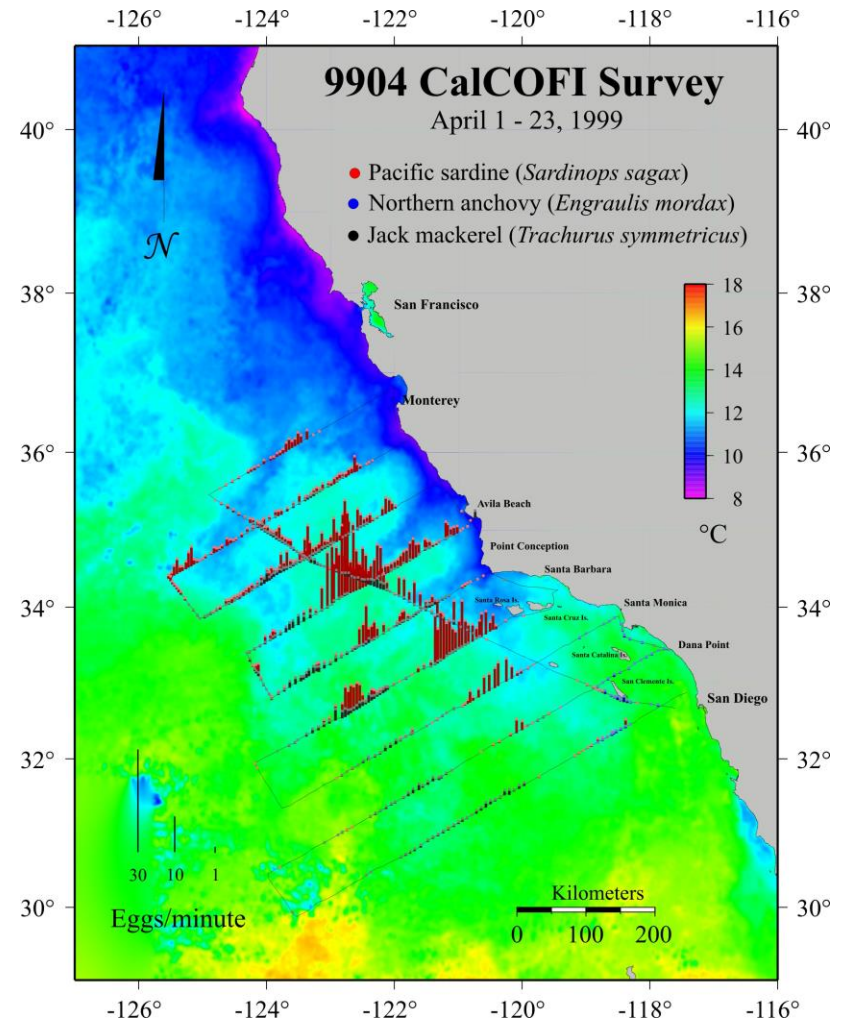
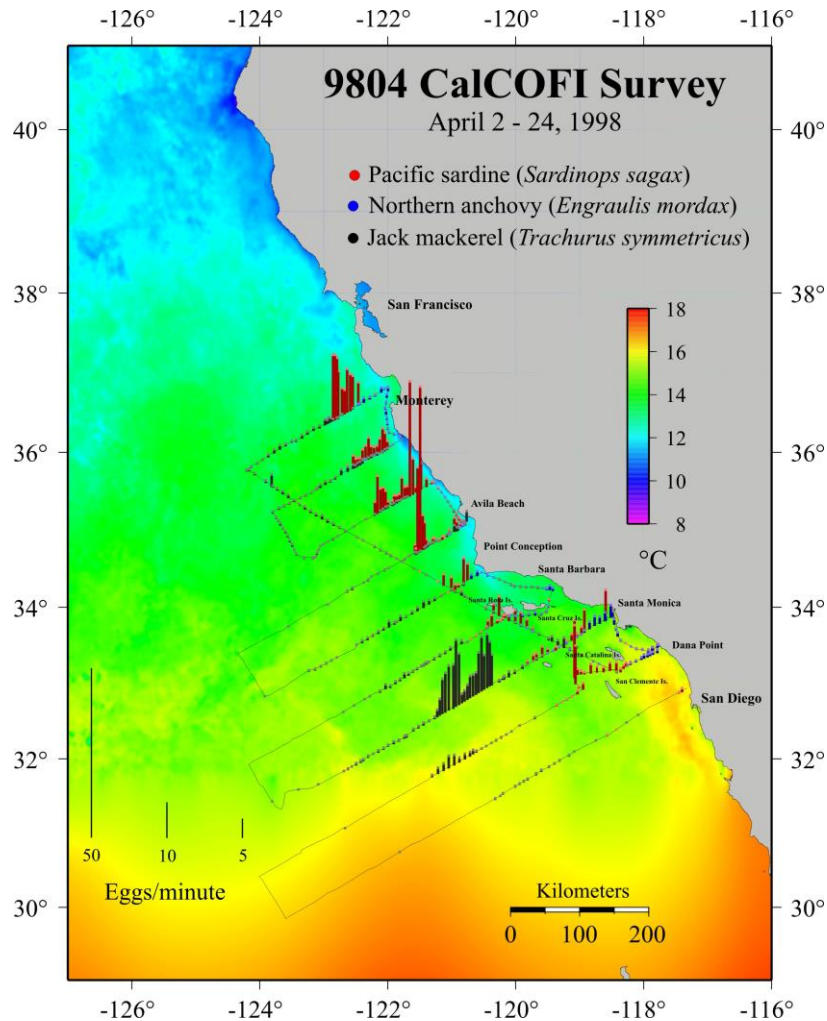
1. Seasonal Movements of Pacific sardine, *Sardinops sagax*



1b. Seasonal Movements of north Pacific albacore, *Thunnus alalunga*



2. Inter-annual Differences in Distribution of Pacific sardine, *Sardinops sagax*



3. Decadal Differences in Distribution of Pacific mackerel, *Scomber japonicus*

**Effect of environmental conditions
on the distribution of Pacific mackerel
(*Scomber japonicus*) larvae
in the California Current system**

Edward D. Weber (contact author)

Sam McClatchie

Email address for contact author: ed.weber@noaa.gov

Fisheries Resources Division
Southwest Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
8604 La Jolla Shores Drive
La Jolla, California 92107

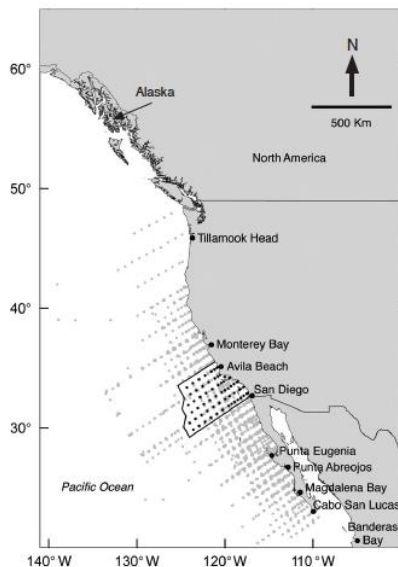


Figure 1

Approximate range of Pacific mackerel (*Scomber japonicus*) in the northeast Pacific. Light gray dots indicate locations where samples were collected as part of the California Cooperative Oceanic Fisheries Investigations (CalCOFI) program and that were used in the study. The area enclosed by the black line indicates the core CalCOFI area, which was sampled in all years of the survey. Black dots indicate the current 66-station sampling pattern that is conducted each quarter.

Weber and McClatchie: Effect of environmental conditions on the distribution of *Scomber japonicus*

89

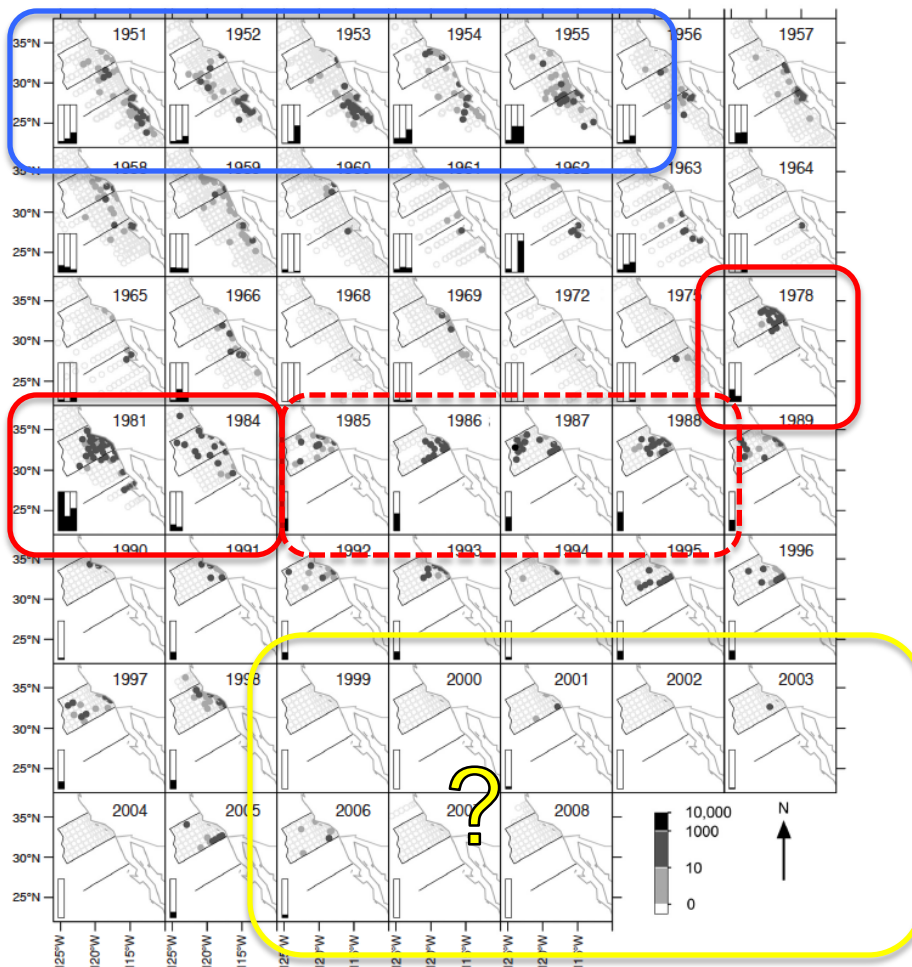
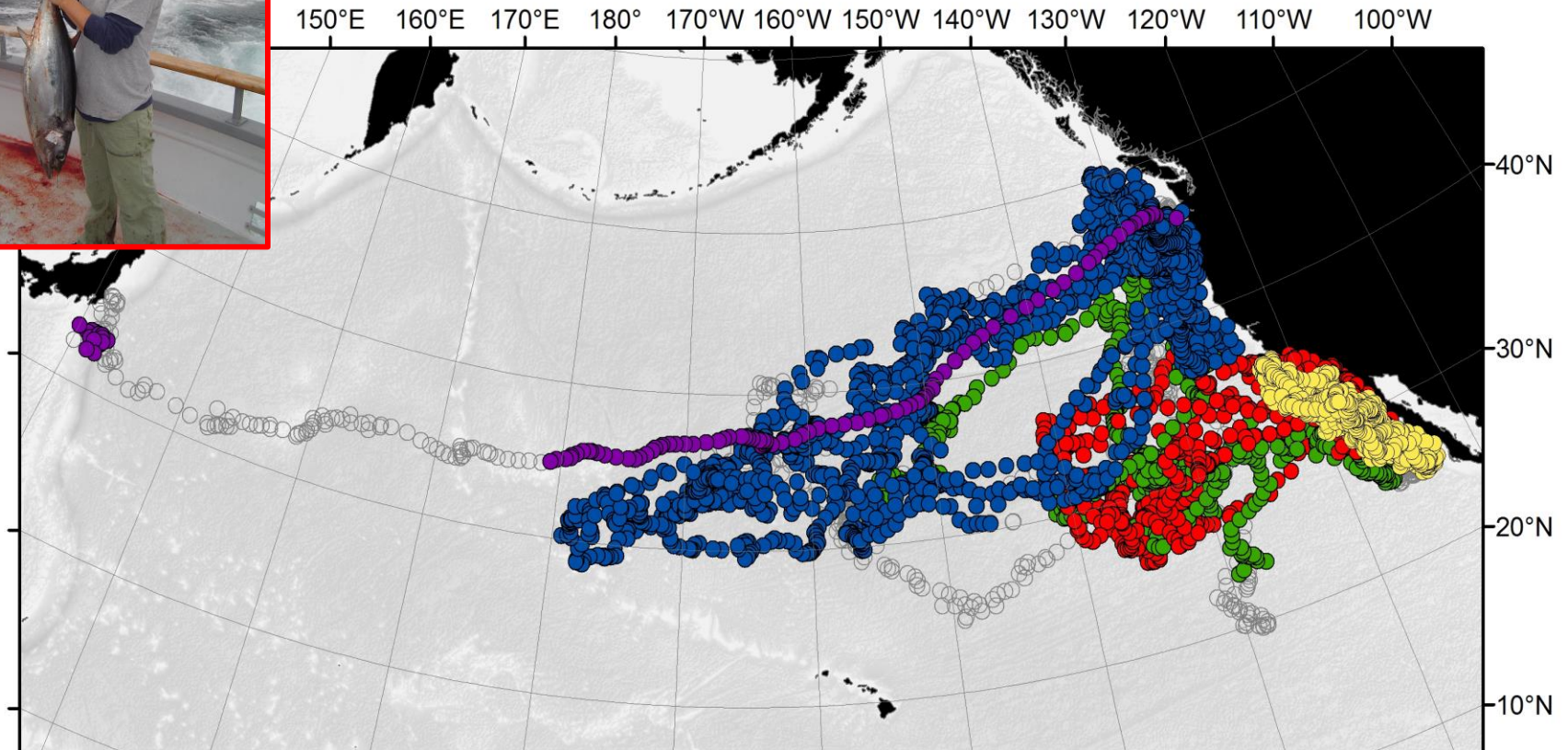


Figure 2

Corrected densities (number/1000 m³) of Pacific mackerel (*Scomber japonicus*) larvae captured in oblique tows from April through September, 1951–2008 as part of the California Cooperative Oceanic Fisheries Investigations (CalCOFI) program. Numbers were corrected for extrusion through the net mesh and net avoidance according

4. Life History Movements of Northern albacore, *Thunnus alalunga*



Migration and behavior of juvenile North Pacific albacore
(*Thunnus alalunga*)

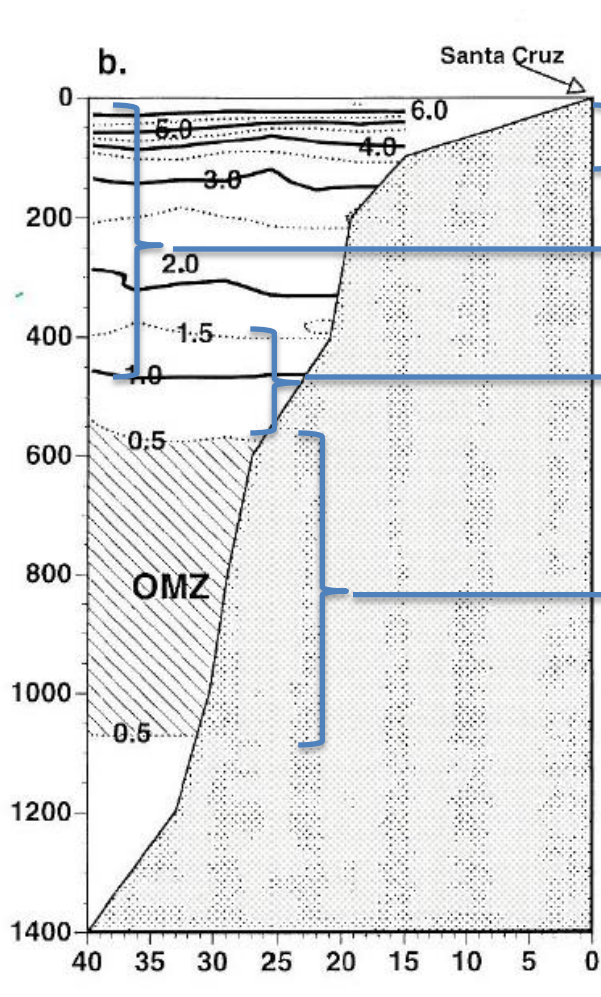
JOHN CHILDERS,* STEPHANIE SNYDER
AND SUZANNE KOHIN

NOAA Fisheries, Southwest Fisheries Science Center, 8604 La
Jolla Shores Dr., La Jolla, CA 92037-1508, USA



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5. Climate Effects on Vertical Distribution and Availability



hypoxic stress in benthic fishes

epipelagic habitat compression

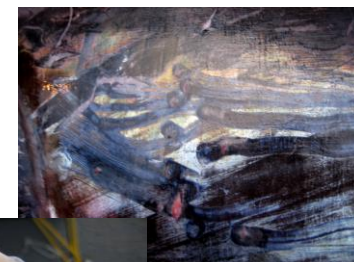
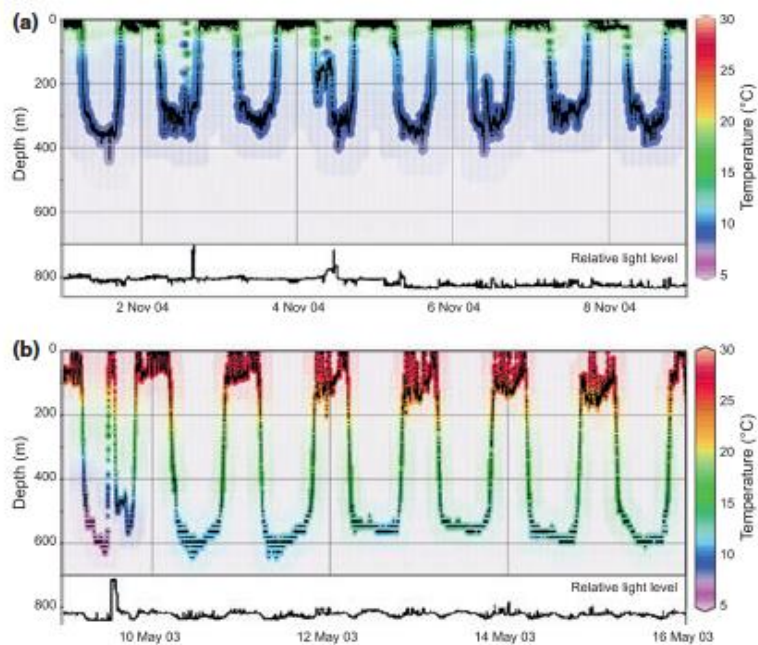
mesopelagic habitat shoaling

hypoxia tolerant fishes



Movements and behaviors of swordfish in the Atlantic and Pacific Oceans examined using pop-up satellite archival tags

Dewar et al. 2011





4. Special Considerations for Monitoring Pelagic Fisheries:

Fishing Strategies for Pelagic Fish

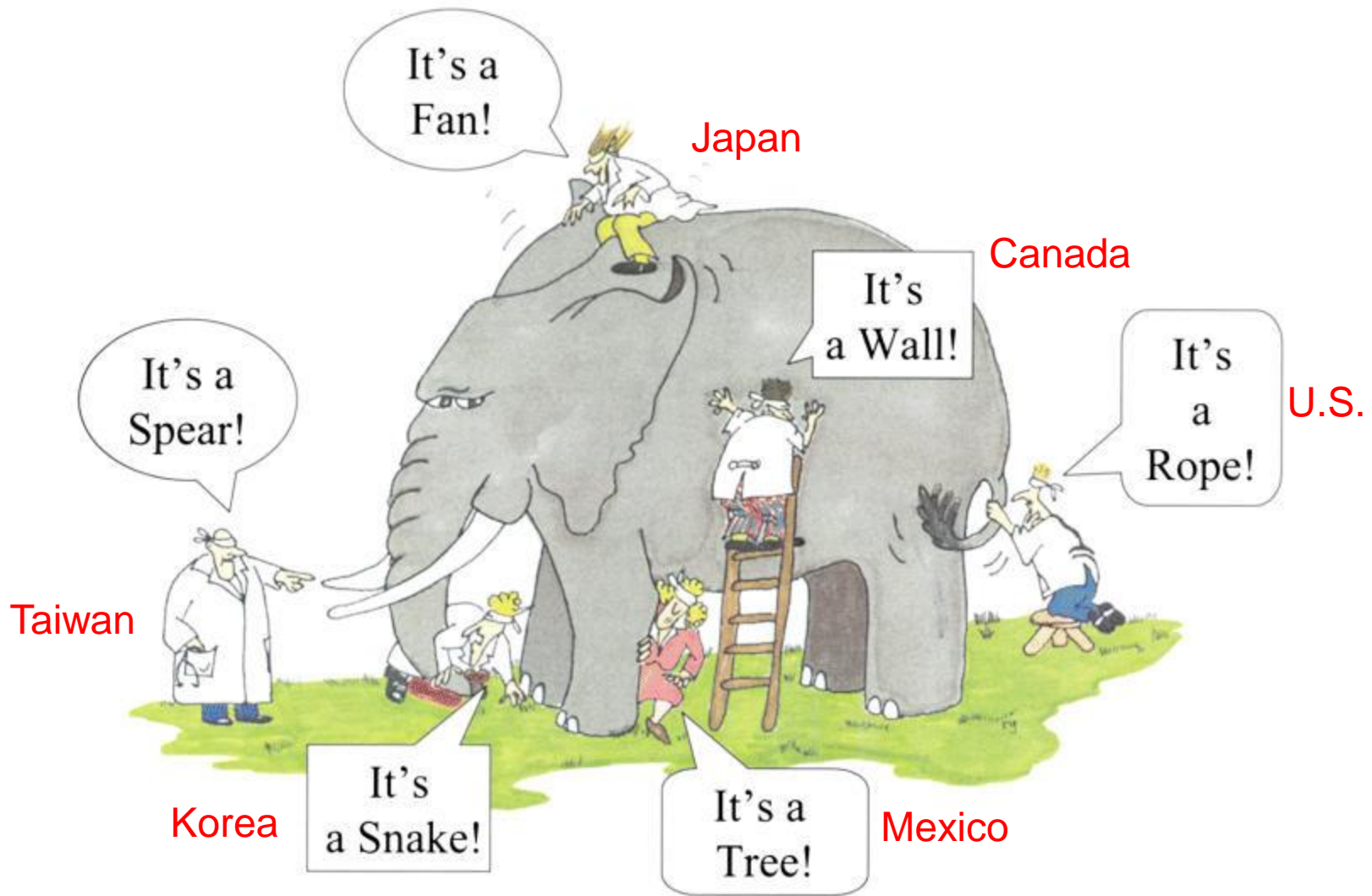
1. Sit and Wait

2. Oceanic Searching =

Oversampling and Undersampling



4b. Special Considerations for CPS and HMS Data Collection



4c. Special Considerations for CPS and HMS Data Collection

Pelagic Fisheries Assessment:

Distribution and Abundance with Time

Fishery Independent Data, Greater Emphasis on:

Fisheries Oceanographic Data

Large Spatial Surveys

Frequent Surveys for High “r” Species

Adaptive Survey Designs

Multi-national Surveys

Fishery Dependent Data, Greater Emphasis on:

Multi-national Fisheries Dependent Data Sources

Location Specific and Fishery Specific Data

Electronic Tagging and Tracking of Migratory Pathways

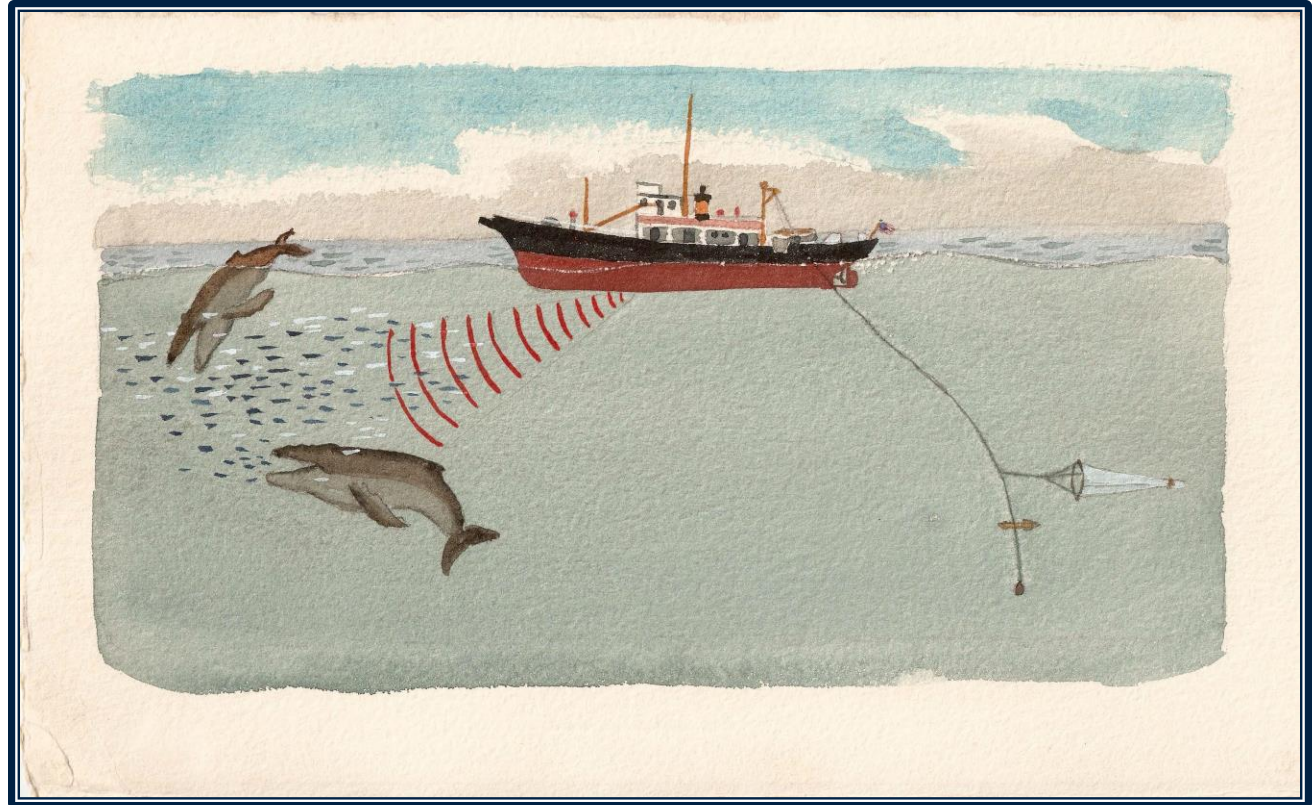
Otolith Microchemical Determinants of Stock Structure

Genetic Determinations of Stock Structure





The Ecosystem Vision



“investigate the sardine in relation to its physical and chemical environment, its food supply, its predators and its competitors” *California Cooperative Oceanic Fisheries Investigations, technical committee 1947*

FRD Strengths

Leading Edge of Survey Development:

Acoustics, Optics, Genetics, Satellite Tagging, CUFES

Integrated Ecosystem Approach:

CalCOFI, Environmental Control Rules, Forage

International Approach:

ISC, IATTC, US-Canada Albacore Treaty

Collaborative Relationship with Industry:

Sardine Survey Workshops, COAST surveys, CCA-ROV survey, Barotrauma Research, Cooperative Albacore Tagging

High Profile, High Value and High Volume Fisheries:

Swordfish, Bluefin, Albacore, Sardine, Market Squid



FRD Challenges

Historic Lows in:

- **Staffing**
- **Research Effort**
- **Data Management**
- **State Involvement**

Constant Challenges for International Engagement:

Limited HQ Legacy and Institutional Wisdom on Pacific Rim Issues:

Emerging Issue of Forage and Forage Indicators:

Emerging Issue of Climate and the Distribution of Pelagic Resources:

Who else is sampling the real ocean?

Strategies to Consider:

Fast Track Existing Vacancies: in particular Assessment- SSC, Statistician, Data Management, Life History, Sea-going

Agree on Formal Plan, Funding and Staffing for:

- **HMS Assessment and Management Responsibilities in ISC**
- **HMS Fishery Dependent Data Management**
- **HMS Research including Life History & Stock Structure**

Consider a Strategic Plan for Seagoing Surveys and CPS Data Management: including acoustic data, ichthyoplankton data, oceanographic data, life history

Consider Approaches to Improve International Sampling of CPS and HMS